



MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES



2008 FISH ADVISORY

A Guide to Eating Missouri Fish

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TABLE OF MISSOURI 2008 FISH ADVISORIES

The Department of Health and Senior Services (DHSS) recommends that all consumers be aware of the positive benefits of eating fish and the potential adverse health effects of contaminants that may be found in fish.

Advisory Population	Location	Species*	Length (>) greater than	Serving Advice no more than	Contaminant
Sensitive Populations: Pregnant women, women of childbearing age, nursing mothers, and children under 13 years old.	All United States water bodies	All fish	All sizes	1/week	Mercury
	Because all fish have various levels of mercury+, EPA recommends sensitive populations consume no more than one (1) fish meal per week from areas where no other advisory is present.				
	All Missouri water bodies	Largemouth, Spotted, Smallmouth Bass	> 12"	1/month	Mercury
	Clearwater Lake in Reynolds County	White Bass	> 15"	1/month	Mercury
All Consumers	Mississippi & Missouri Rivers	Shovelnose Sturgeon (excluding eggs)	All sizes	1/month	PCBs, Chlordane, Mercury
		Sturgeon eggs		Do not eat	
		Flathead, Channel, Blue Catfish	> 17"	1/week	
		Carp species	> 21"	1/week	
	Blue River from Minor Park to confluence with Brush Creek in Jackson County	Carp species	> 23"	1/month	PCBs, Chlordane
		Channel Catfish	> 19"	1/week	
	Turkey Creek near Highway "P" in Jasper County	Buffalo species	> 21"	1/week	PCBs, chlordane
	Big River in St. Francois and Jefferson counties	Sunfish, carp, redhorse suckers, and other types of suckers	All sizes	Do not eat	Lead
	Flat River in St. Francois County from Highway "B", six miles downstream to where it enters the Big River	Sunfish, carp, redhorse suckers, and other types of suckers	All sizes	Do not eat	Lead
	Big Creek near the town of Glover in Iron County	Sunfish species	All sizes	Do not eat	Lead
	Middle Fork of Black River in Reynolds County	Smallmouth Bass	All sizes	Do not eat	Lead
	Simpson Park Lake at Simpson Park in St. Louis County	Largemouth Bass	>12"	Do not eat	Lead, Mercury, Chlordane
		Buffalo species	>16"	1/month	Chlordane, Mercury, PCBs

+As stated in the U.S. Environmental Protection Agency (EPA) *National Fish Advisory for Mercury*, in the absence of a local advisory, individuals in the sensitive populations should consume fish at rate of no more than one (1) meal per week. For more information go to:

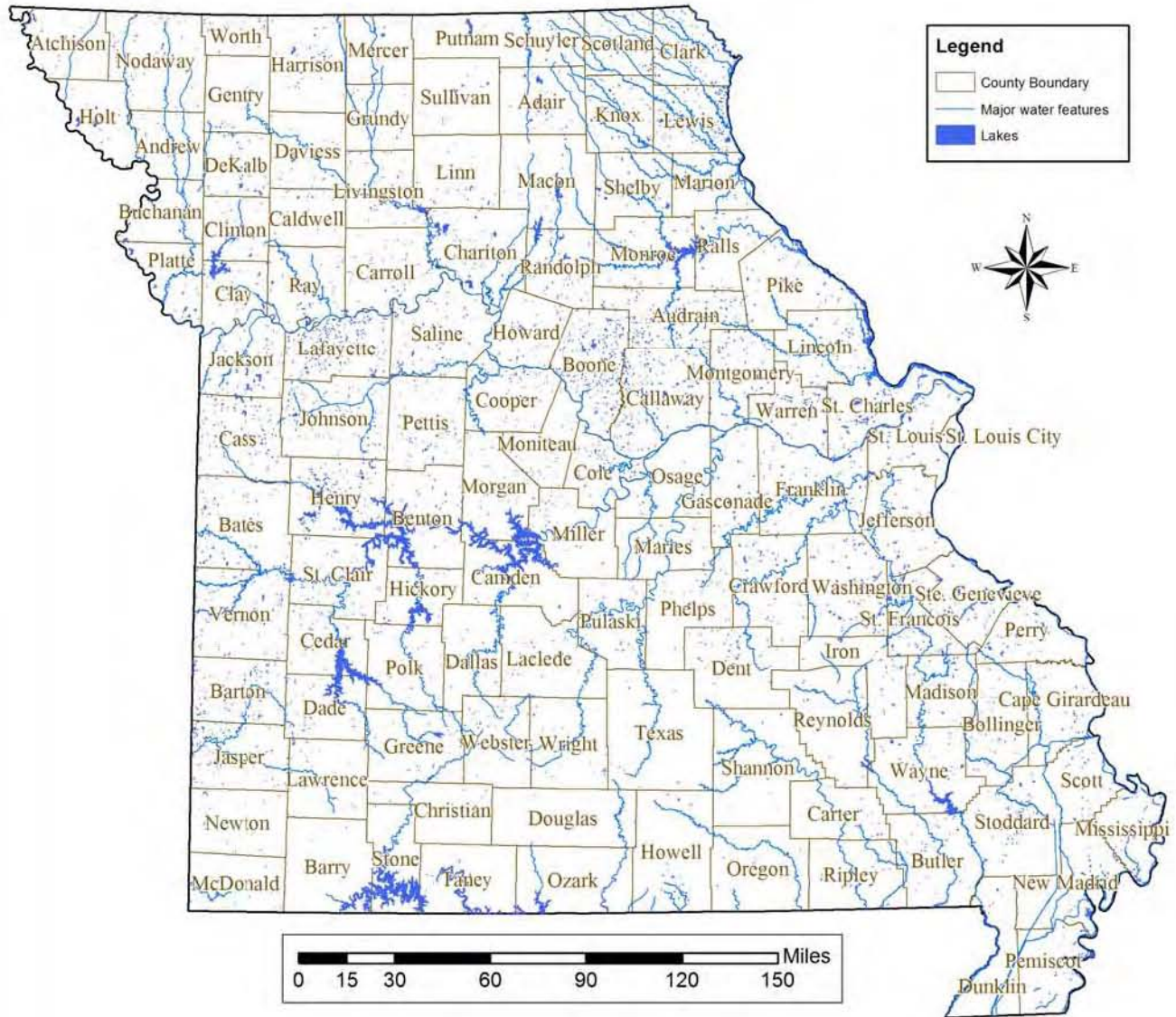
<http://www.epa.gov/waterscience/fishadvice/1-meal-per-week.pdf>

* To help you identify fish species, see the Missouri Department of Conservation's website at: http://mdc.mo.gov/documents/fish/2_010.PDF



MAP OF MISSOURI COUNTIES AND MAJOR WATERWAYS

Map of Missouri Counties and Major Waterways





THE GUIDE

The purpose of this guide is to inform individuals of the benefits of eating fish, and which fish species should be eaten in limited quantities, or not eaten at all, due to environmental contaminants. Fish is a good source of high-quality protein, “heart healthy” fatty acids, and essential nutrients that contribute to a healthy diet if eaten regularly. Fish is low in cholesterol, and some types of fish have omega-3 fatty acids that are essential in the development of the central nervous system and may be beneficial in reducing heart disease.



Annually, the DHSS evaluates the level of contaminants in fish to make sure they are safe to eat. All fish contain some small amount of chemical contaminants. In most instances and for most people, the health benefits of eating fish outweigh the potential health risks from contaminants. However, there are occasions when limited or even no consumption of fish is appropriate.

To evaluate potential health risks from contaminants in fish, the Missouri Department of Health and Senior Services (DHSS) works with the Missouri Department of Natural Resources (MDNR), Missouri Department of Conservation (MDC), and other government agencies. DHSS bases the advisory on extensive annual fish tissue studies that have been conducted since 1985 at various Missouri lakes, ponds, rivers, and streams by the MDC and DNR. Each year, the DHSS evaluates the data on contaminant levels, and uses the most recent science to develop reasonable conservative consumption guidelines for Missouri.

This guide is not intended to discourage you from eating fish; rather, it is a guide to help you make informed decisions about eating fish from Missouri’s numerous waterbodies.

GENERAL INFORMATION

General Rules to Follow

Don’t stop eating fish. Smaller fish tend to have lower levels of contamination than larger fish of the same species. Eat the smaller, legal-size fish and release the lunkers so they can fight another day.

Posted Signs

If a fishing location has warning signs posted, follow those specific local guidelines. The locations in the summary table do not include local warnings. **Specific warnings are special cases and should be followed.**

How to Prepare Fish

The levels of some chemicals in fish that you eat can be reduced by filleting the fish and carefully trimming away the fat when the fish is cleaned (*See trimming and cooking guide below*). **Some chemicals, like lead, concentrate in bones while other chemicals, such as chlordane and PCBs, concentrate in fatty tissue. So, when fish is prepared by filleting and trimming away the fat, these contaminants are minimized. Filleting will not reduce the levels of some metals, such as mercury.**





TRIMMING AND COOKING YOUR FISH TO REDUCE FAT AND CHEMICAL CONTAMINANTS



Fillet your fish. Filleting is strongly recommended because removing bones, fatty tissues, and all internal organs will greatly reduce contaminant levels in fish.

(See Fish Preparation video at

<http://fn.cfs.purdue.edu/anglingindiana/FishPreparation/FishPrepFlash06/fishmovie.swf>)



Trim away fatty portions of the fish such as the dorsal, lateral, and belly area. (See diagram below.)



Remove the skin from your fish.



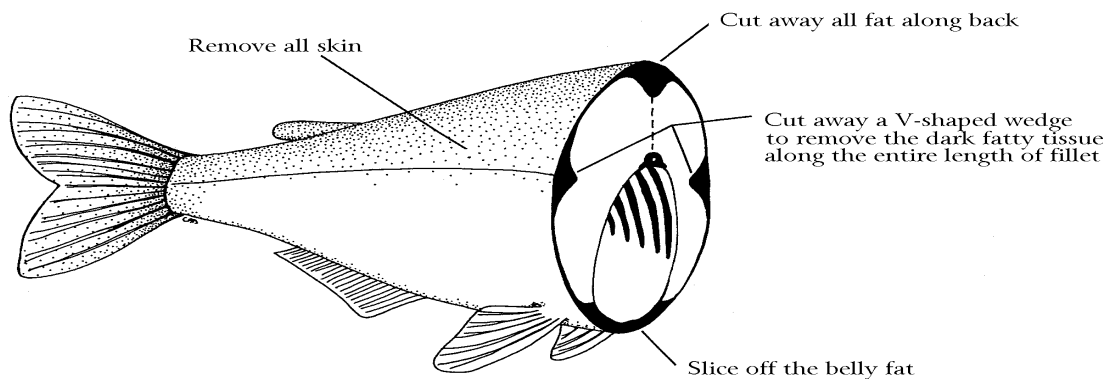
Do not eat the eggs. They are very high in fat and may contain contaminants that are associated with fatty tissue.



Bake, grill, or broil your fish on a rack and let the fat drip away. Do not use the juices. Avoid pan-frying in butter or animal fat, or making soups or chowders. These methods retain fat-laden juices. If you deep-fry your fish, do not reuse the oil. Contaminants will become concentrated in that oil.



Trimming fat or special cooking methods will not reduce the levels of metals such as lead or mercury from fish.





HEALTH BENEFITS OF EATING FISH

DHSS's core public health functions include protecting Missourians from the adverse health effects of hazardous substances as well as promoting healthy habits in Missouri citizens. The intent of this guide and its associated Internet links is to provide a means of selecting fish with lower levels of contaminants while maintaining the health benefits of a diet that includes fish.

Certain types of fish are beneficial for the health of individuals, especially for nursing mothers and growing children. Fish is a good source of the omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are essential in the development of the central nervous system. DHA is found in certain fish and is also found in humans in the cell membranes of the eyes, brain, and other parts of the central nervous system. DHA's importance in development, vision, and learning has been demonstrated in several studies. For these reasons and others, DHA is an important nutrient for infants and possibly the fetus.

Recent medical research provides evidence that both the young and old can have significant benefits from eating fish. Fish is low in cholesterol and is a good source of high-quality protein, a "heart healthy" combination of the omega-3 fatty acids, and essential nutrients and minerals such as iron and zinc that will contribute to a healthy diet if eaten regularly. In one study of adults, the death rate from heart disease was 36 percent lower among those who ate fish twice a week compared with those who ate little or no seafood. The American Heart Association recommends individuals include fish in their diets due to evidence that shows a link between eating fish and lowered risk of death from coronary heart disease. DHA and other omega-3 fatty acids may be beneficial in reducing heart disease and may have other beneficial health effects.

TERMS USED IN THE ADVISORY

SENSITIVE POPULATIONS

Because growth and development occurs rapidly in young children, some chemicals may affect them differently than adults. During the development of this fish advisory, special consideration has been given to women who are pregnant, women of childbearing age, nursing mothers, and children under 13 years of age. These groups will be referred to as **sensitive populations** throughout this advisory.

FISH LENGTH

Fish are measured from snout to the tip of the tail as shown in the drawing.



MEAL

One meal is considered to be 11 ounces of uncooked fish for a 150-pound person and 3 ounces for a 40-pound child. An 11-ounce meal is approximately equal to the size of two decks of cards.




BIOACCUMULATE

Bioaccumulation occurs when a chemical is taken into the body faster than the body can get rid of it.. Predator fish or larger fish typically bioaccumulate chemicals to higher concentrations than smaller fish.



FISH CONSUMPTION ADVISORIES

Missouri's fish consumption advisories are as follows:

-  **Unrestricted consumption, except for sensitive populations; ***
-  **Limited consumption;**
 - Consume no more than **one (1) meal a week** (52 meals a year)
 - Consume no more than **one (1) meal a month** (12 meals a year)
-  **No consumption** of fish (Do not eat).

* The U.S. Environmental Protection Agency (EPA) has recommended in their 2004 *National Advisory for Mercury* that sensitive populations should eat no more than one (1) meal of fish per week. This recommendation is to provide a baseline of protection from mercury contamination. Additional information on this mercury advisory is provided below in "Contaminants of Concern".

Please refer to the summary table for a listing of all of 2008 fish advisories.

ALL OTHER WATERBODIES

DHSS has an **unrestricted consumption** advisory for **catfish, buffalo, freshwater drum, suckers, paddlefish, and many other sport fish**. These fish may be consumed in unlimited quantities except for the areas mentioned in the summary table and for sensitive populations.



Smaller and/or younger fish such as sunfish and crappie tend to have lower levels of contaminants in their bodies because they consume smaller prey and have not lived as long to have time to accumulate as many contaminants. Because of this, they are less likely to contain contaminants that bioaccumulate in the muscle or fat tissue. With the exception of

sensitive populations and the locations discussed in the advisory summary table, these fish also can be consumed in unlimited amounts.

As stated in the EPA *National Fish Advisory for Mercury*, in the absence of a local advisory, individuals in the sensitive populations should consume fish at rate of one (1) meal per week. For more information go to:
<http://www.epa.gov/waterscience/fishadvice/1-meal-per-week.pdf>



The EPA and Food and Drug Administration's consumer advisory for mercury in commercial fish recommends that women who are pregnant, women of childbearing age who might become pregnant, nursing mothers, and young children not eat any Shark, Swordfish, King Mackerel, or Tilefish. This group can safely consume up to 12 ounces a week of Shrimp, canned light Tuna, Salmon, Pollock, or Catfish. Albacore ("white") Tuna has more mercury than canned light Tuna, thus this group should eat no more than six ounces a week of white Tuna. For more information go to:
<http://www.epa.gov/waterscience/fishadvice/advice.html>.



CONTAMINANTS OF CONCERN

Many adverse health effects of chemicals are discussed below; however, in most cases, the benefits of eating fish outweigh the risks of exposure to these chemicals.

Mercury/Methylmercury

Methylmercury's potential to bioaccumulate in fish and its ability to move around in the body of living organisms make it the form of mercury with the greatest risk to humans through fish consumption. The meal advice given in this fish advisory only takes into consideration an individual's exposure to methylmercury from eating fish and does not take into consideration other possible forms or sources of mercury. Individuals exposed to other sources of mercury may be at higher risk of adverse health effects.



Mercury occurs naturally in the environment and can enter the environment from natural sources through the breakdown of rocks and soil and from volcanic activity. Human activities such as mining and burning of fossil fuels may account for one-third to two-thirds of the mercury released to the environment. Typically, the levels of mercury in the air are very low and do not pose a health risk. Mercury is sometimes used in thermometers, barometers, batteries, electrical switches, dental fillings, and some herbal and religious remedies.

In water and soil, microorganisms and natural processes convert mercury into methylmercury. Fish and other organisms can quickly take up the methylmercury in water directly from the water or by eating other animals or organisms already containing methylmercury. Once methylmercury is in the fish tissue, it may stay there for a long period of time.

Nearly all fish contain trace amounts of mercury. However, this does not mean that eating fish will cause adverse health effects from mercury. In fact, for most individuals, the amount of mercury taken into the body from eating most fish is not a health concern. Whether or not a health concern exists is dependent on several factors such as an individual's age, weight, amount of fish eaten, and the amount of mercury present in the fish they eat. Smaller and/or younger fish tend to have lower levels of mercury in their bodies because they consume smaller prey and have not lived as long to have time to accumulate as much mercury in their bodies.

This year's evaluation of the most recent fish tissue data indicates that mercury levels in some Missouri fish continue to pose a possible health risk to children who eat fish regularly. In the advisory for all waterbodies, we provide sensitive populations with meal advice to eat no more than one meal per month of largemouth bass, spotted bass, and smallmouth bass greater than 12 inches in length and no more than one meal per week of all other sport fish. Because of the absence of comprehensive information on mercury levels in all fish species, EPA has recommended that sensitive populations eat no more than one meal of fish per week in order to provide a baseline of protection from mercury contamination. For more information, please go to: <http://www.epa.gov/waterscience/fishadvice/advice.html>. In addition, we advise sensitive populations eat no more than one meal per month of white bass greater than 15 inches in length taken from Clearwater Lake in Reynolds County.

Health Effects of Mercury

The organic form of mercury, methylmercury, is extremely toxic to humans. The primary health effect of ingesting methylmercury is impaired neurological development. Unborn and young children are at a greater risk of adverse health effects associated with methylmercury because they are in the early stages



of neurological development. Expectant and nursing mothers can also pass methylmercury to their children.

In cases of high levels of exposure to methylmercury, impaired central nervous system function and kidney damage or failure may occur. Impairment of the central nervous system function from methylmercury may include paresthesia (abnormal sensations of skin such as numbness, tingling, prickling, or burning sensations), ataxia (shaky, unsteady movement), impairment of hearing, and narrowing of visual field. At lower exposures, developmental delays and IQ deficits may occur in children. In some repeated poisoning incidents, people who ate contaminated fish or seed grains with high levels of methylmercury developed permanent damage to the brain and kidneys. More recent studies have found that, along with being a neurotoxin, methylmercury increases risk for cardiovascular diseases.

For more information see: [Mercury Update: Impact on Fish Advisories](#) and Agency for Toxic Substances and Disease Registry's (ATSDR) [ToxFAQs for Mercury](#).

Chlordane and Polychlorinated Biphenyls (PCBs)

Chlordane's and polychlorinated biphenyls' (PCBs') potential to bioaccumulate in fish makes consumption of fish a risk in certain water bodies in Missouri. The manufacturing of PCBs was stopped in 1977, and chlordane was banned for all uses in 1988. However, because PCBs and chlordane don't break down easily in the environment, were widely used, and moved within the environment, chlordane and PCBs can still be found throughout the United States.



While in decline in Missouri, chlordane and PCBs continue to persist in the environment. The meal advice presented in the summary table is for all consumers of fish. Health effects from these chemicals may vary among members of the population. Mothers and children are considered more susceptible to these chemicals, thus this fact was considered when constructing advisories.

Chlordane is a man-made chemical, which was used as a pesticide from 1948 to 1988. Prior to 1978, chlordane was used on crops, lawns, and gardens. In 1978, EPA canceled the use of chlordane on food crops and phased out other above ground uses of chlordane over the next 5 years; however, from 1983 to 1988, chlordane was still used for termite control. Individuals living in homes that were treated with chlordane may be exposed to more chlordane than others. Chlordane is still produced in the United States for export.

The manufacturing of PCBs stopped in the United States in 1977. PCBs don't burn easily and are a good insulator. Because of these properties, PCBs were used as coolants and lubricants in transformers and other electrical equipment.

Health Effects of Chlordane

Chlordane's effects on the body are typically on the nervous system, digestive system, and the liver. Exposure to levels of chlordane may cause headaches, irritation, confusion, weakness, vision problems, upset stomach, vomiting, stomach cramps, diarrhea, and jaundice.

Chlordane accumulates in fatty tissue. Since breast milk is high in fat, women with levels of chlordane in their system may pass chlordane to their children through breast milk.



For more information see: Agency for Toxic Substances and Disease Registry's ([ATSDR ToxFAQs for Chlordane](#)).

Health Effects of Polychlorinated Biphenyls (PCBs)

Health effects of PCBs include chloracne and other skin changes, decreased birth weight of offspring, and may affect the immune system and nervous system in humans. PCBs may cause mild neurodevelopment delays in some children.

PCBs accumulate in fatty tissue. Since breast milk is high in fat, women with levels of PCBs in their system may pass PCBs to their children through breast milk.

For more information see: [Polychlorinated Biphenyls \(PCBs\) Update: Impact on Fish Advisories](#) and Agency for Toxic Substances and Disease Registry's (ATSDR) [ToxFAQs for PCBs](#).

Lead

Lead's potential to bioaccumulate in fish makes consumption of fish a risk in certain regions of Missouri, especially in mining areas. The meal advice given in this fish advisory only takes into consideration an individual's exposure to lead from eating fish and does not take into consideration other possible sources of lead listed below. Individuals exposed to other sources of lead may be at higher risk of adverse health effects.



Lead is a naturally occurring metal found in the earth's crust. Throughout most of its history, Missouri has been the top producer of lead in the country. Deposits of lead ore have been discovered and mined in many of Missouri's counties south of the Missouri River. In counties like Jasper, Madison, Jefferson, St. Francois, Washington, and Iron where lead mining has occurred, soil from yards and drinking water from private wells may contain levels of lead much higher than other parts of Missouri.

In addition, lead is sometimes found in old water pipes and solder, toys, jewelry, herbal remedies, Mexican candies, water hoses, lead weights and sinkers, and other items some individuals often eat or mouth. At one time, lead was used as an additive in gasoline and in paint. Lead from gasoline was released into the air in automotive exhaust and deposited along roadways. Houses built before 1978 may contain lead based paint. Lead in the soils in the inner cities is often attributable to lead based paint and leaded gasoline.

Health Effects of Lead

Lead has no nutritional benefits for humans. Children are more susceptible than adults are to lead poisoning. Lead has the greatest effect on the nervous system in adults and especially in children. Pregnant women can experience complications with their pregnancy if they are exposed to high levels of lead. These complications can range from low birth weight to miscarriage. Nursing mothers with levels of lead in their blood may pass lead to their children through breast milk.

Lead is most dangerous to the unborn and young children because a larger proportion of the lead swallowed will enter the blood in children than in adults and because of its ability to affect the nervous system. Adverse health effects of lead in children may include decreased intelligence quotient (IQ) scores, learning disabilities, slowed growth, hyperactivity, impaired hearing, and at very high exposure levels, even brain damage. In children and adults, low levels of lead can cause weakness in fingers, wrists, or ankles. Unborn children can also be exposed to lead through their mothers and are at risk of premature births, low birth weight, decreased mental ability, learning difficulties, and reduced growth as



young children. **Yearly blood-lead testing before a child is 72 months old is key to determining if a child has been exposed to lead.**

For more information see: [ATSDR's ToxFAQs for Lead](#).

FUTURE CHEMICAL CONSIDERATIONS

With advancements in technology, scientists are now able to better detect and quantify certain chemicals in waterbodies. In addition, new technology and new products are continually being developed, sometimes with unforeseen environmental or health issues. Some chemicals and new technologies that are currently being studied for environmental and human health effects include polybrominated diphenyl ethers (PBDEs), endocrine disruptors, pharmaceuticals and personal care products (PPCPs), and nanoscale materials. Together these are sometimes called “emerging contaminants”. **At present, none of these chemicals or technologies result in a fish consumption advisory.** The Department of Health and Senior Services will continue to monitor advancements in the science pertaining to emerging contaminants. Each of these will be discussed briefly below.

Polybrominated Diphenyl Ethers (PBDEs)

PBDEs are man-made flame-retardant chemicals added to a variety of consumer products, such as plastic and foam, to reduce their ability to burn. Because PBDEs are so widespread in the environment, they may also be found in fish tissue. Today, most people have been exposed to low levels of PBDEs from many sources in their everyday environment. However, there is little information on the health effects of PBDEs on humans.

For more information see: [ATSDR's ToxFAQs for Polybrominated Diphenyl Ethers \(PBDEs\)](#).

Endocrine Disruptors

Endocrine disruptors are chemicals that when absorbed in the body affect the endocrine system, also called the hormone system. A chemical can affect the endocrine system by mimicking a body's natural hormones, blocking the effects of a hormone, or directly stimulating or inhibiting the endocrine system. While there is strong evidence that chemical exposures have had an affect on the development and reproduction of fish and wildlife in certain locations, the effect of these chemicals at low levels on humans is currently not well understood.

For more information see: [EPA's Endocrine Disruptor Screening Program \(EDSP\)](#)

Pharmaceuticals And Personal Care Products (PPCPs)

PPCPs are a very broad classification of thousands of chemical substances that, in general, include products used by individuals for personal health or cosmetic reasons or used in agriculture to increase growth or health of livestock. PPCPs include prescription and over-the-counter medication, veterinary drugs, cosmetics, sunscreen, vitamins, and others. Studies have found PPCPs in our nation's waterbodies in most of the places that have been sampled. Research suggest that some ecological harm may occur when certain PPCPs are present; however, currently, no health effects on humans have been identified from human exposure to PPCPs in the environment.

For more information on how to dispose of prescription drugs see: [The White House Office of National Drug Control Policy guidance for the Proper Disposal of Prescription Drugs](#).

For more information on PPCPs see: [EPA's Pharmaceuticals and Personal Care Products \(PPCPs\)](#).



Nanoscale Materials

Nanotechnology makes it possible to create microscopic materials roughly 100 to 10,000 times smaller than the thickness of human hair. These nanoscale materials may have different properties than the same chemical substance at a large size. These properties may include being lighter, stronger, and/or more reactive than the original substance. Nanotechnology has the potential to provide many benefits. However, some of the properties that make nanoscale materials useful may also pose a hazard to humans and the environment under certain conditions. Nanotechnology is in its early stages of development, and few detailed studies are available on effects of nanoscale materials on humans or the environment.

For more information on nanotechnology and nanoscale materials see: [EPA's Fact Sheet for Nanotechnology under the Toxic Substances Control Act](#).

FINAL THOUGHTS

It is our intent that the guidelines presented here help you minimize any potential health risks while maximizing the benefits of eating Missouri fish.

**DHSS HOPES YOU CAN GET OUT AND ENJOY MISSOURI WATERWAYS AND
WISHES YOU GOOD LUCK FISHING.**

For more information, you can call visit our web site at <http://www.dhss.mo.gov/fishadvisory/>
or call us at 573-751-6102 or (toll-free) 866-628-9891.

To help you identify fish species, see the Missouri Department of Conservation's website at
the following address: http://mdc.mo.gov/documents/fish/2_010.PDF.

